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OIPE JC19
JUL 19 2004
PATENT & TRADEMARK OFFICE

Attorney Docket Number: FS.20104US1A
Applicant: Okuyama et al.
Title: SPEED CONTROL SYSTEM AND METHOD FOR WATERCRAFT
Application Number: 10/691,754

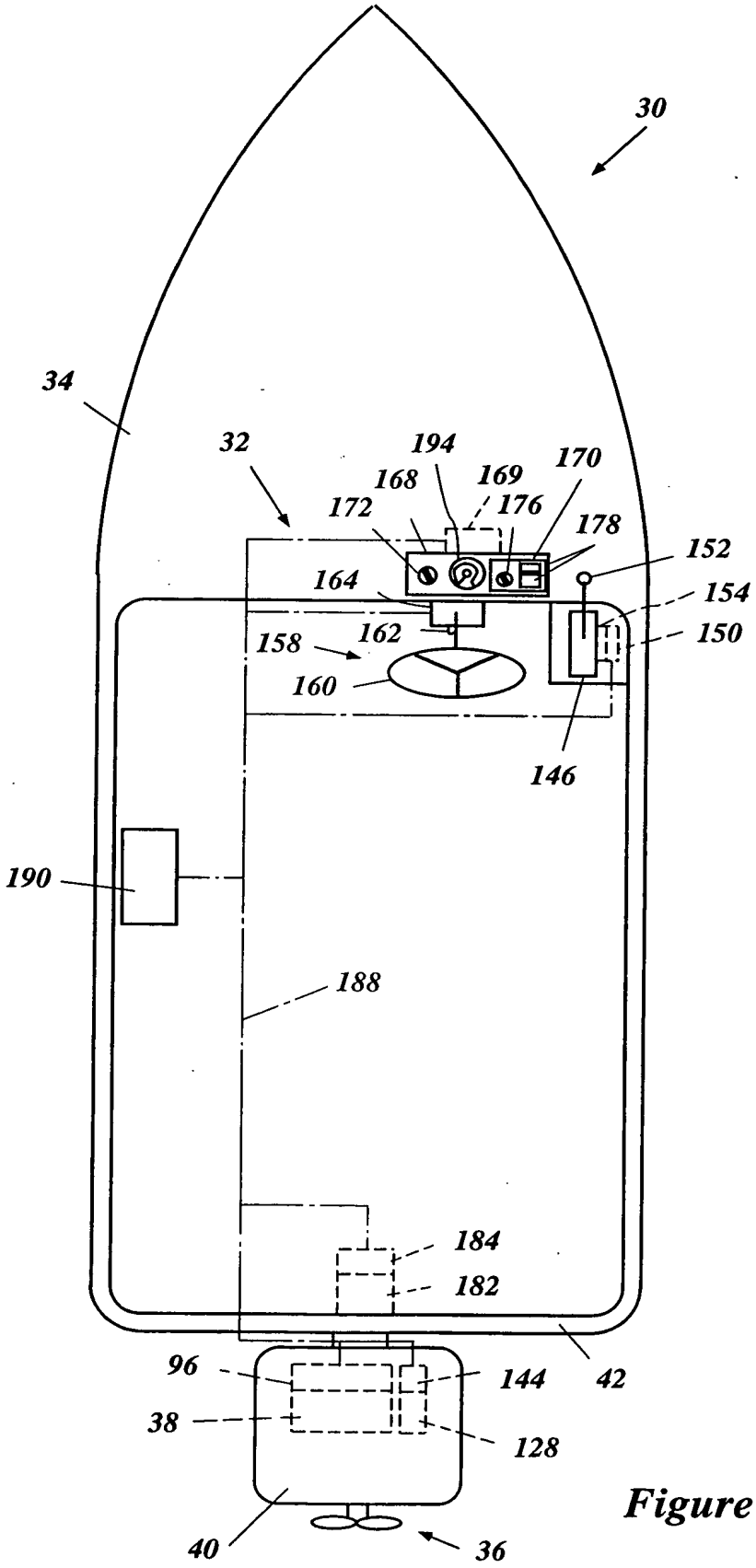

Figure 1

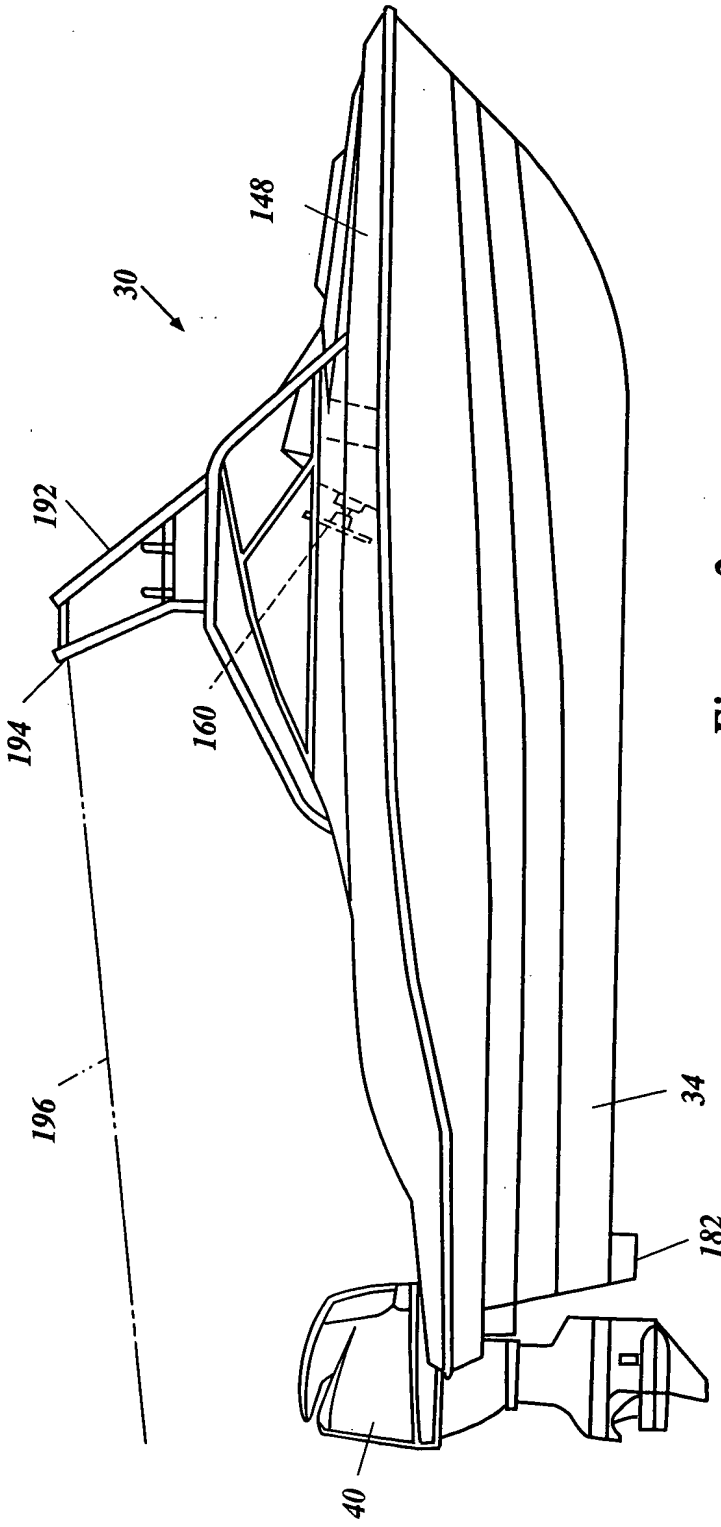

Figure 2

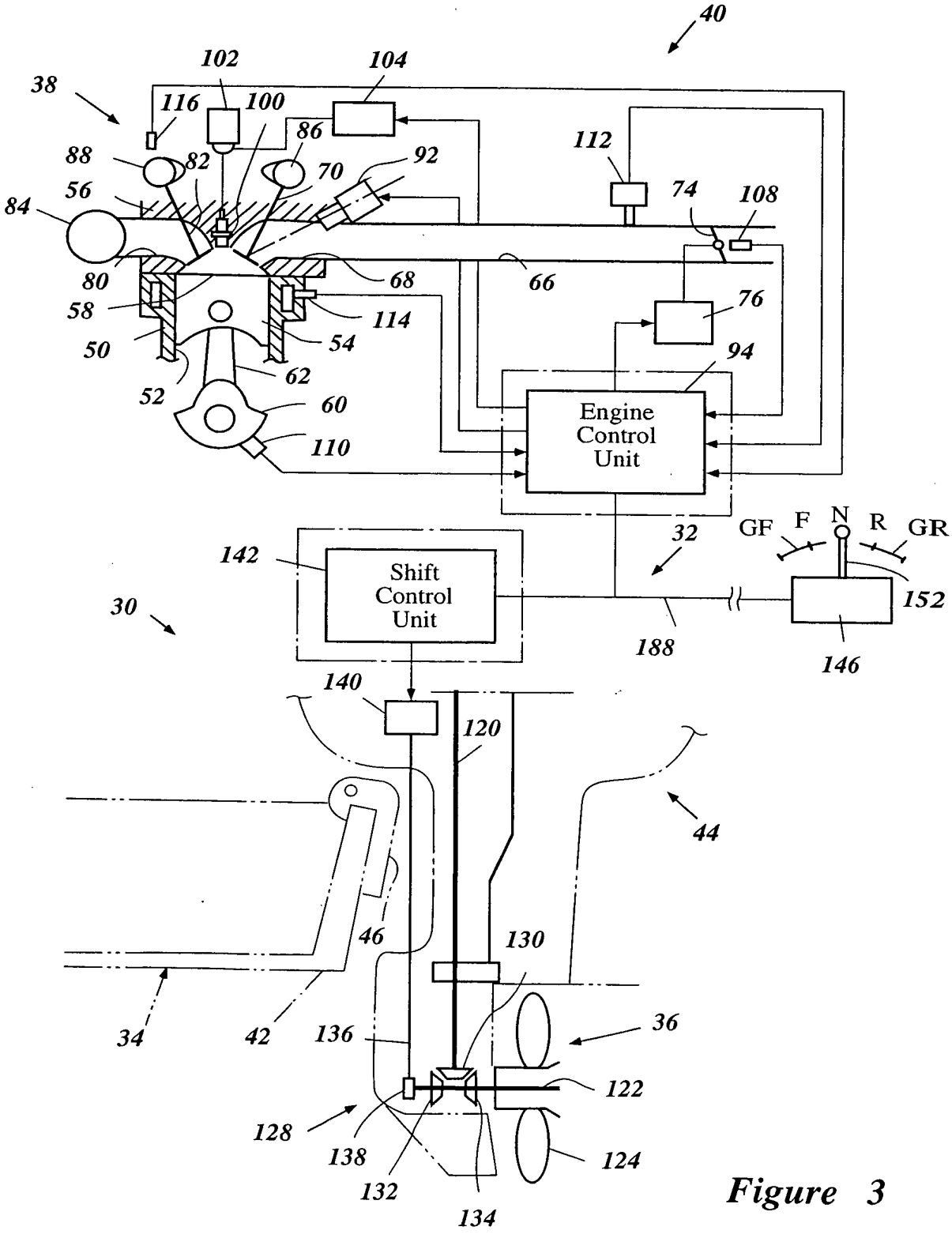
40
38
102
104
116
100
86
88
82
70
92
112
74
108
56
84
80
68
66
58
114
76
50
54
94
62
52
60
Engine Control Unit
110
GF
F
N
R
GR
32
142
Shift Control Unit
152
30
188
146
140
120
44
46
130
34
42
136
36
122
128
138
124
132
134

Figure 3

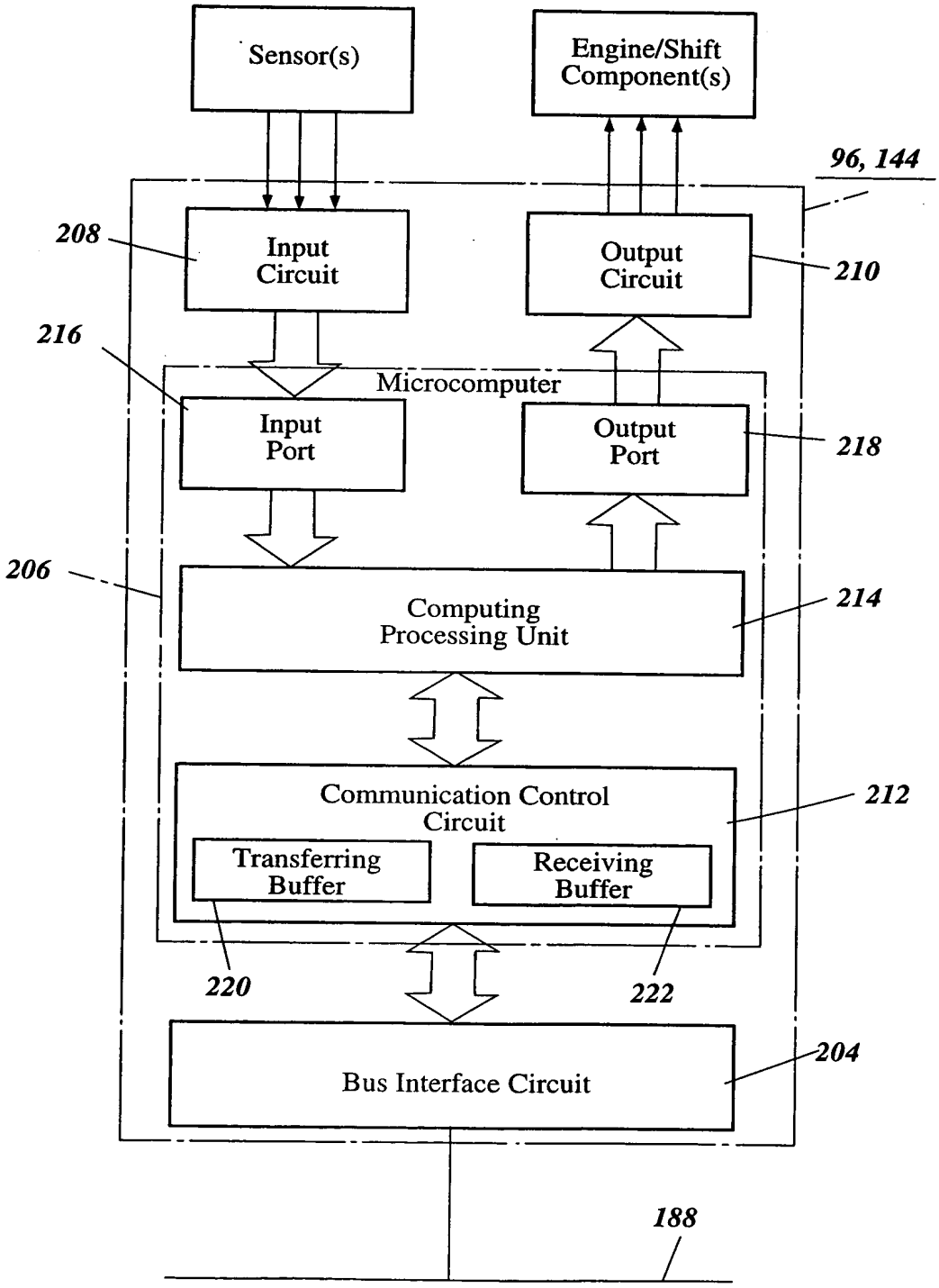
Sensor(s)
Engine/Shift Component(s)
96, 144
208
Input Circuit
Output Circuit
210
216
Microcomputer
Input Port
Output Port
218
206
Computing Processing Unit
214
Communication Control Circuit
212
Transferring Buffer
Receiving Buffer
220
222
Bus Interface Circuit
204
188

Figure 4

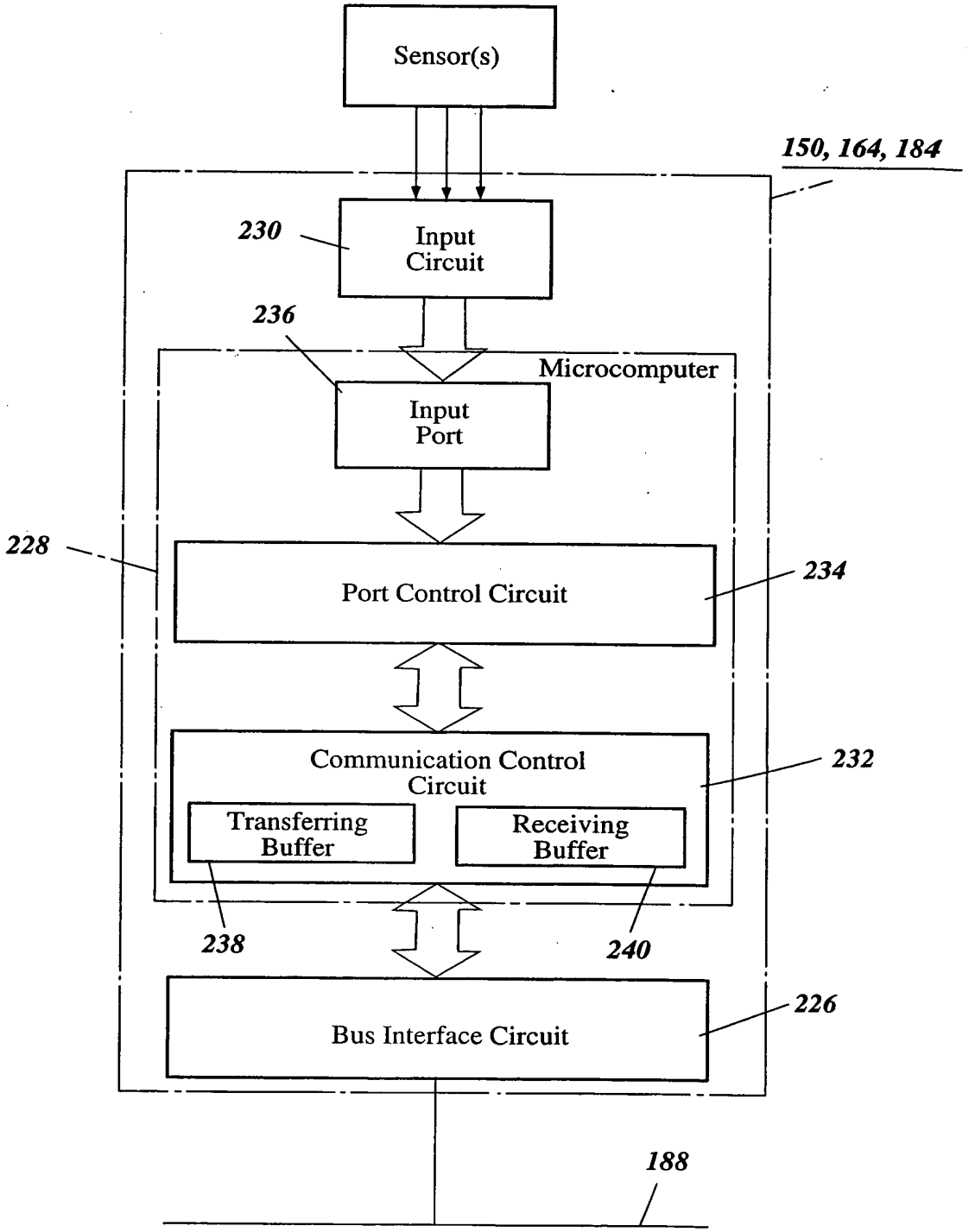
Sensor(s)
150, 164, 184
230
Input Circuit
236
Microcomputer
Input Port
228
Port Control Circuit
234
Communication Control Circuit
232
Transferring Buffer
Receiving Buffer
238
240
Bus Interface Circuit
226
188

Figure 5

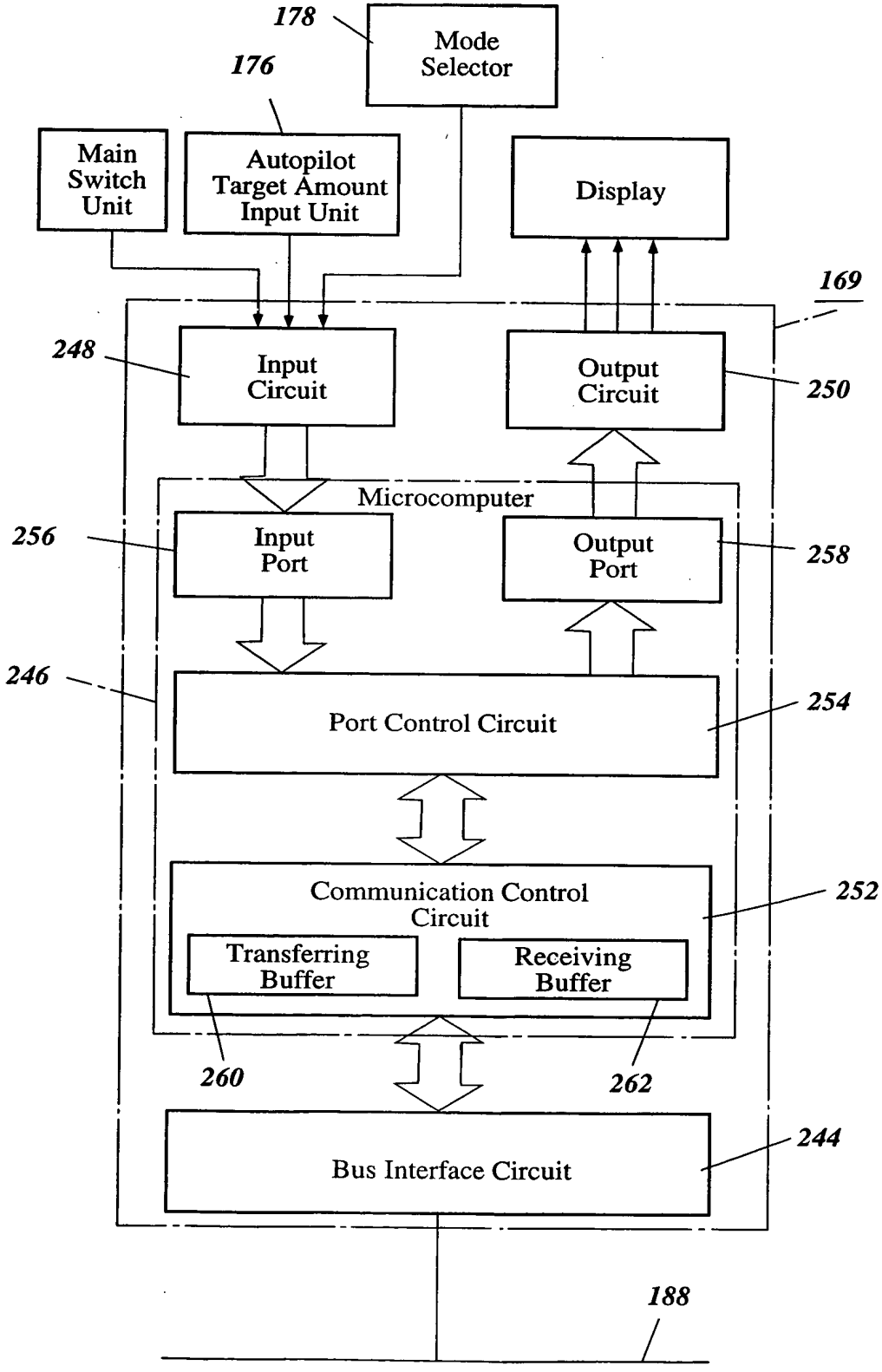
178
Mode Selector
176
Main Switch Unit
Autopilot Target Amount Input Unit
Display
169
248
Input Circuit
Output Circuit
250
Microcomputer
256
Input Port
Output Port
258
246
Port Control Circuit
254
Communication Control Circuit
252
Transferring Buffer
Receiving Buffer
260
262
Bus Interface Circuit
244
188

Figure 6

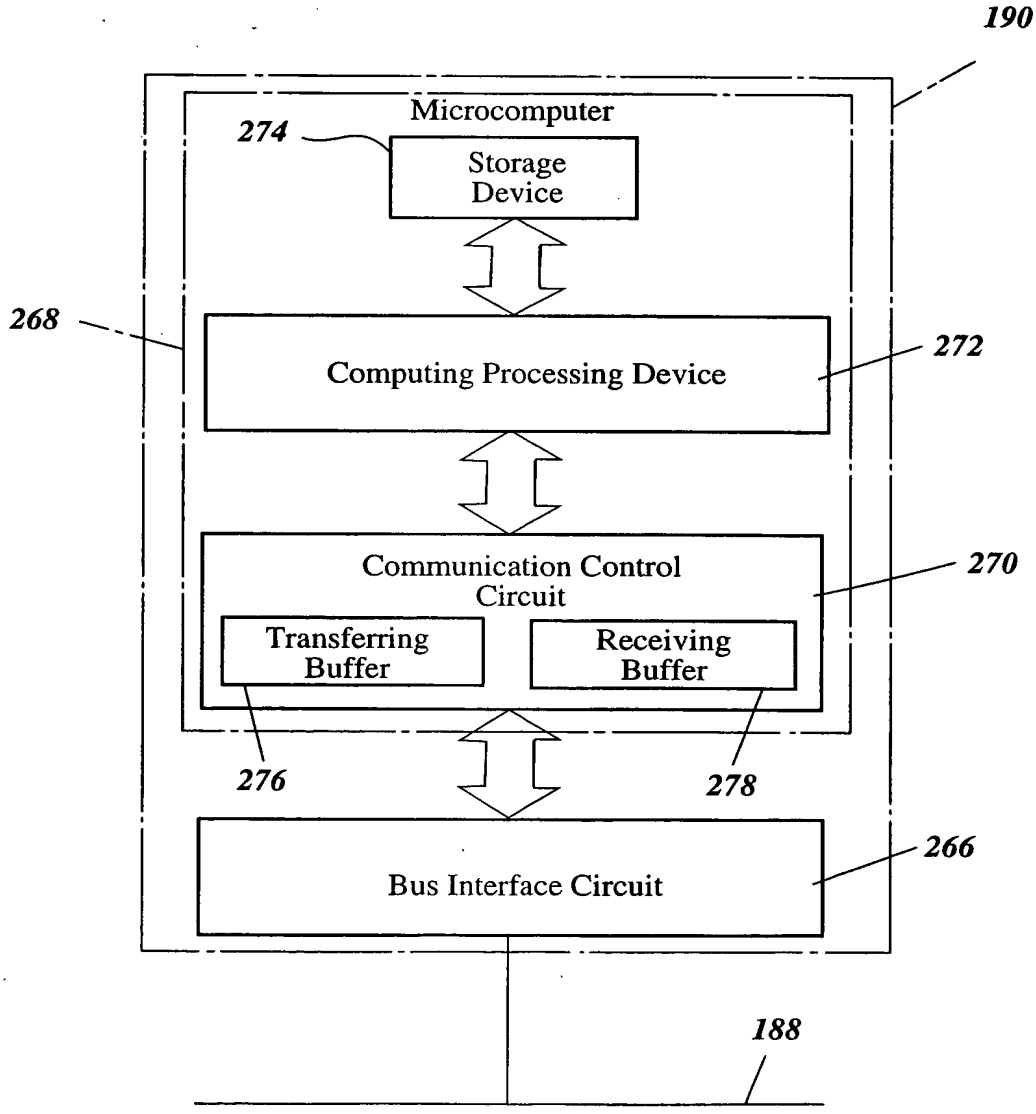
190
Microcomputer
274
Storage Device
268
Computing Processing Device
272
Communication Control Circuit
270
Transferring Buffer
Receiving Buffer
276
278
Bus Interface Circuit
266
188

Figure 7

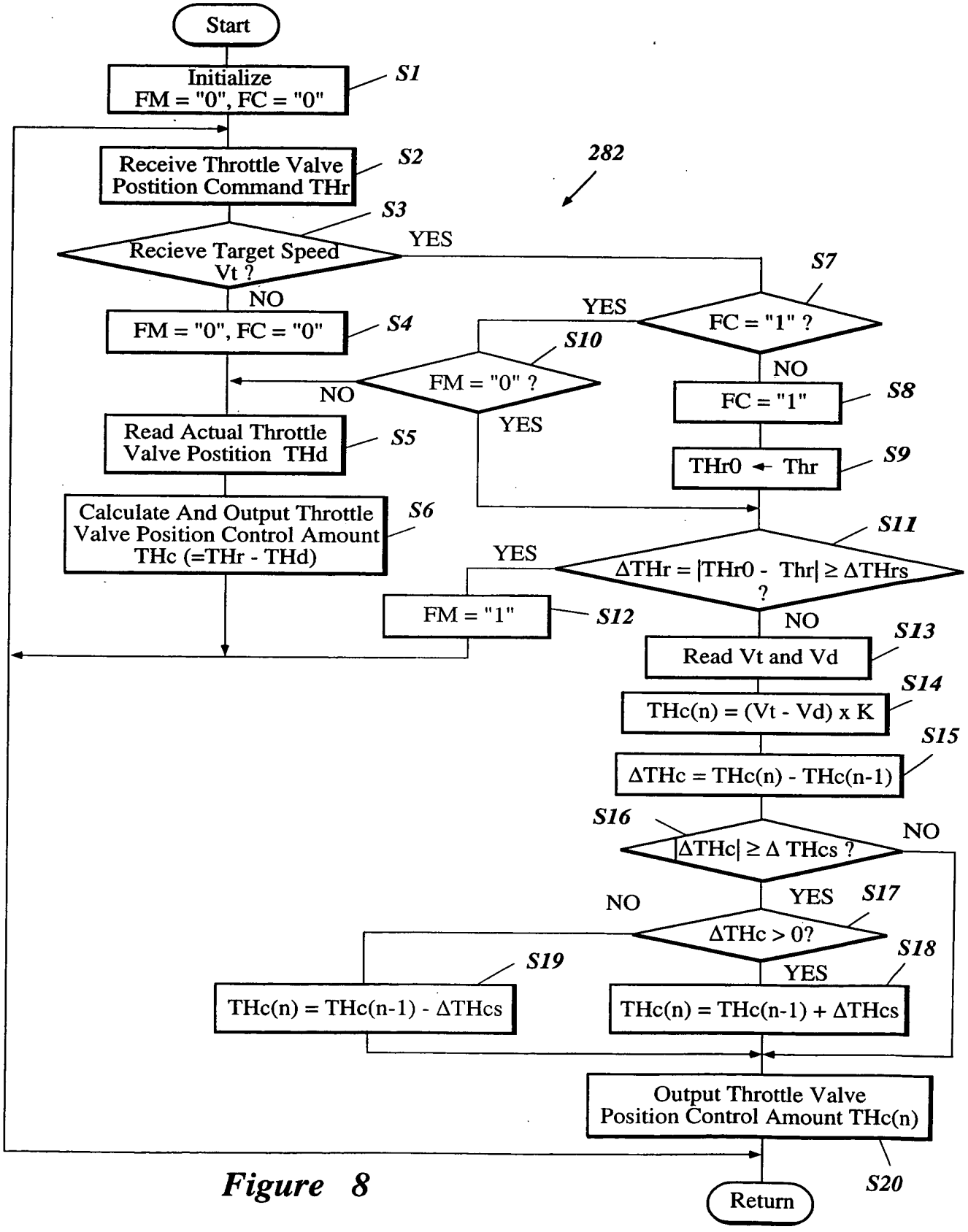
Start
Initialize
FM = "0", FC = "0"
S1
Receive Throttle Valve
Postition Command THr
S2
282
S3
Recieve Target Speed
Vt ?
YES
NO
S7
FC = "1" ?
YES
NO
FM = "0", FC = "0"
S4
S10
FM = "0" ?
NO
YES
S8
FC = "1"
Read Actual Throttle
Valve Postition THd
S5
S9
THr0 ← Thr
Calculate And Output Throttle
Valve Position Control Amount
THc (=THr - THd)
S6
S11
ΔTHr = |THr0 - Thr| ≥ ΔTHrs
?
YES
NO
FM = "1"
S12
S13
Read Vt and Vd
S14
THc(n) = (Vt - Vd) x K
S15
ΔTHc = THc(n) - THc(n-1)
S16
|ΔTHc| ≥ Δ THcs ?
NO
YES
S17
NO
ΔTHc > 0?
S18
S19
YES
THc(n) = THc(n-1) - ΔTHcs
THc(n) = THc(n-1) + ΔTHcs
Output Throttle Valve
Position Control Amount THc(n)
S20
Return

Figure 8

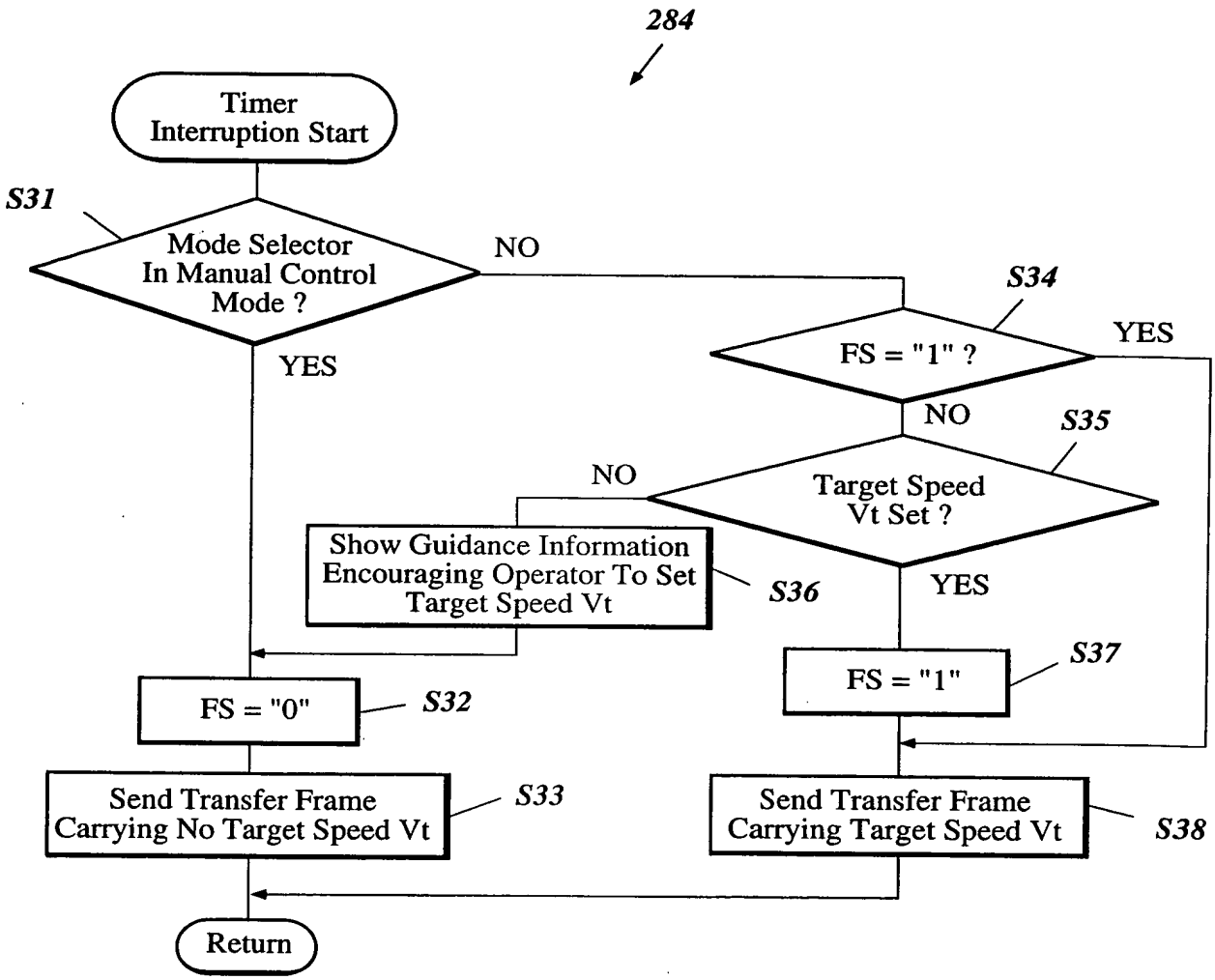
284
Timer Interruption Start
S31
Mode Selector In Manual Control Mode ?
NO
YES
S34
FS = "1" ?
YES
NO
S35
Target Speed Vt Set ?
NO
YES
Show Guidance Information Encouraging Operator To Set Target Speed Vt
S36
FS = "0"
S32
FS = "1"
S37
Send Transfer Frame Carrying No Target Speed Vt
S33
Send Transfer Frame Carrying Target Speed Vt
S38
Return

Figure 9

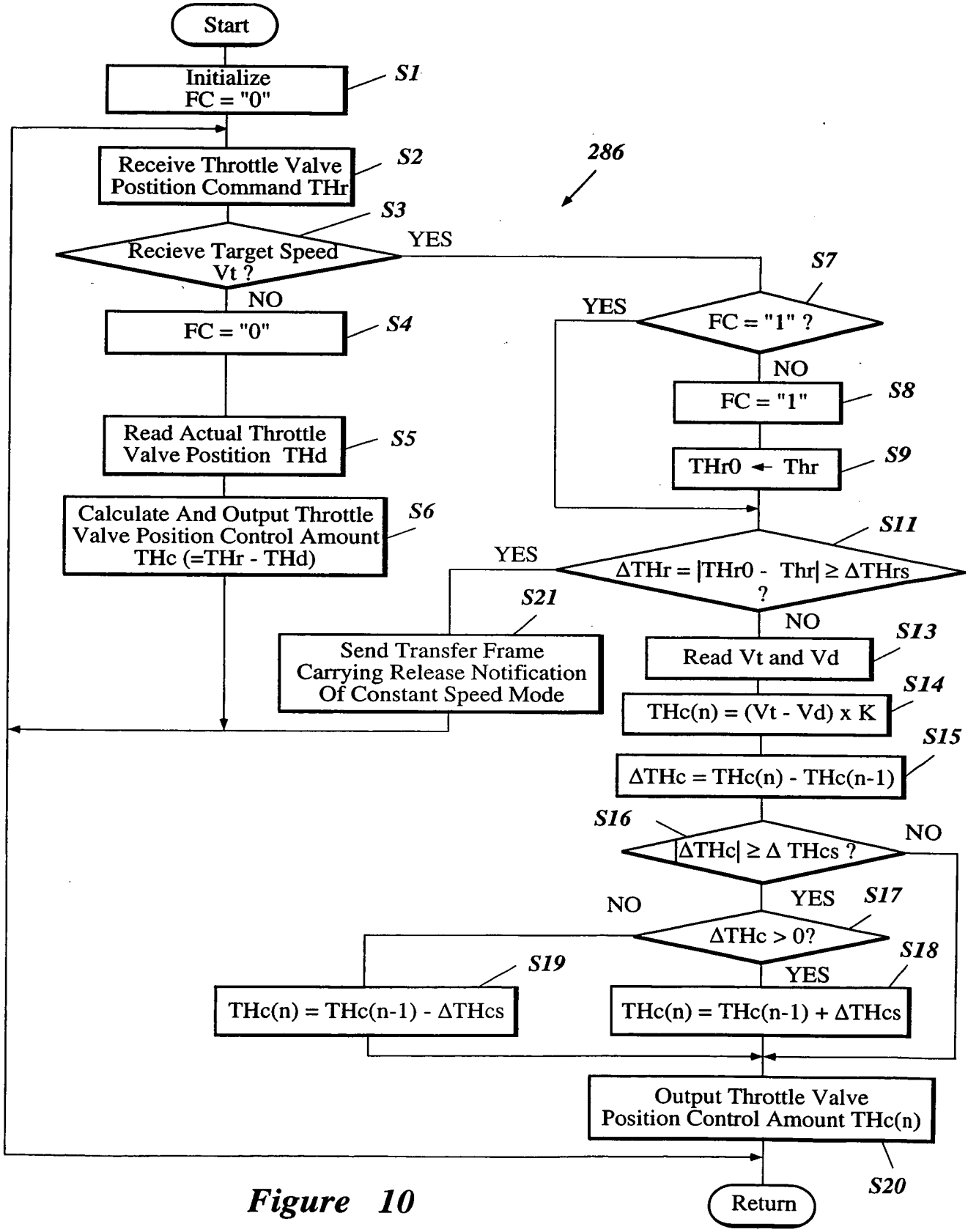
Start
Initialize FC = "0"
S1
Receive Throttle Valve Postition Command THr
S2
286
S3
Recieve Target Speed Vt ?
YES
NO
FC = "0"
S4
Read Actual Throttle Valve Postition THd
S5
Calculate And Output Throttle Valve Position Control Amount THc (=THr - THd)
S6
S7
YES
FC = "1" ?
NO
FC = "1"
S8
THr0 ← Thr
S9
S11
YES
ΔTHr = |THr0 - Thr| ≥ ΔTHrs ?
NO
S21
Send Transfer Frame Carrying Release Notification Of Constant Speed Mode
S13
Read Vt and Vd
S14
THc(n) = (Vt - Vd) x K
S15
ΔTHc = THc(n) - THc(n-1)
S16
|ΔTHc| ≥ Δ THcs ?
NO
YES
S17
NO
ΔTHc > 0?
S18
YES
S19
THc(n) = THc(n-1) - ΔTHcs
THc(n) = THc(n-1) + ΔTHcs
Output Throttle Valve Position Control Amount THc(n)
S20
Return

Figure 10

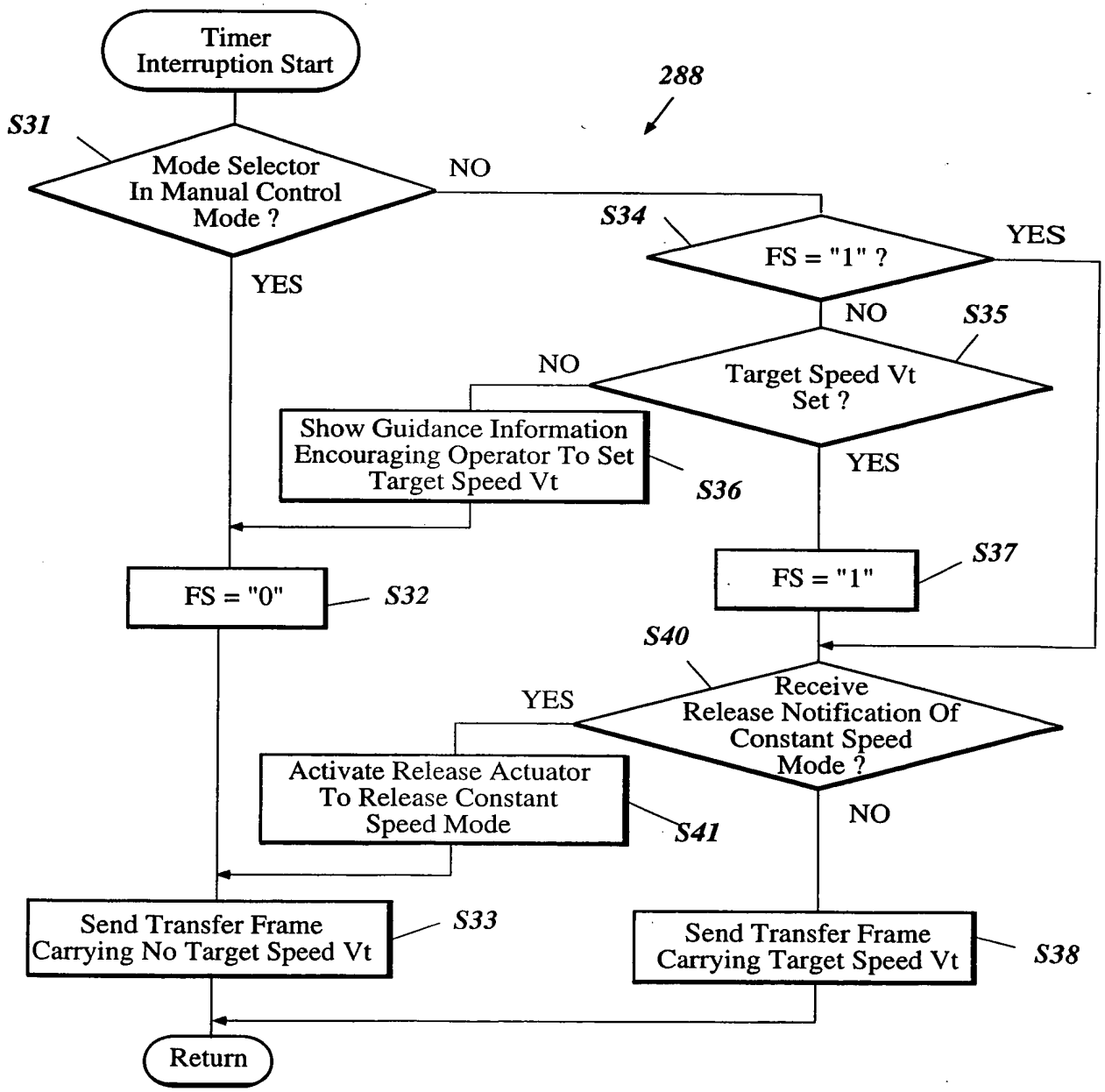
Timer Interruption Start
288
S31
Mode Selector In Manual Control Mode ?
NO
YES
S34
FS = "1" ?
YES
NO
S35
Target Speed Vt Set ?
NO
YES
Show Guidance Information Encouraging Operator To Set Target Speed Vt
S36
FS = "0"
S32
FS = "1"
S37
S40
Receive Release Notification Of Constant Speed Mode ?
YES
NO
Activate Release Actuator To Release Constant Speed Mode
S41
Send Transfer Frame Carrying No Target Speed Vt
S33
Send Transfer Frame Carrying Target Speed Vt
S38
Return

Figure 11

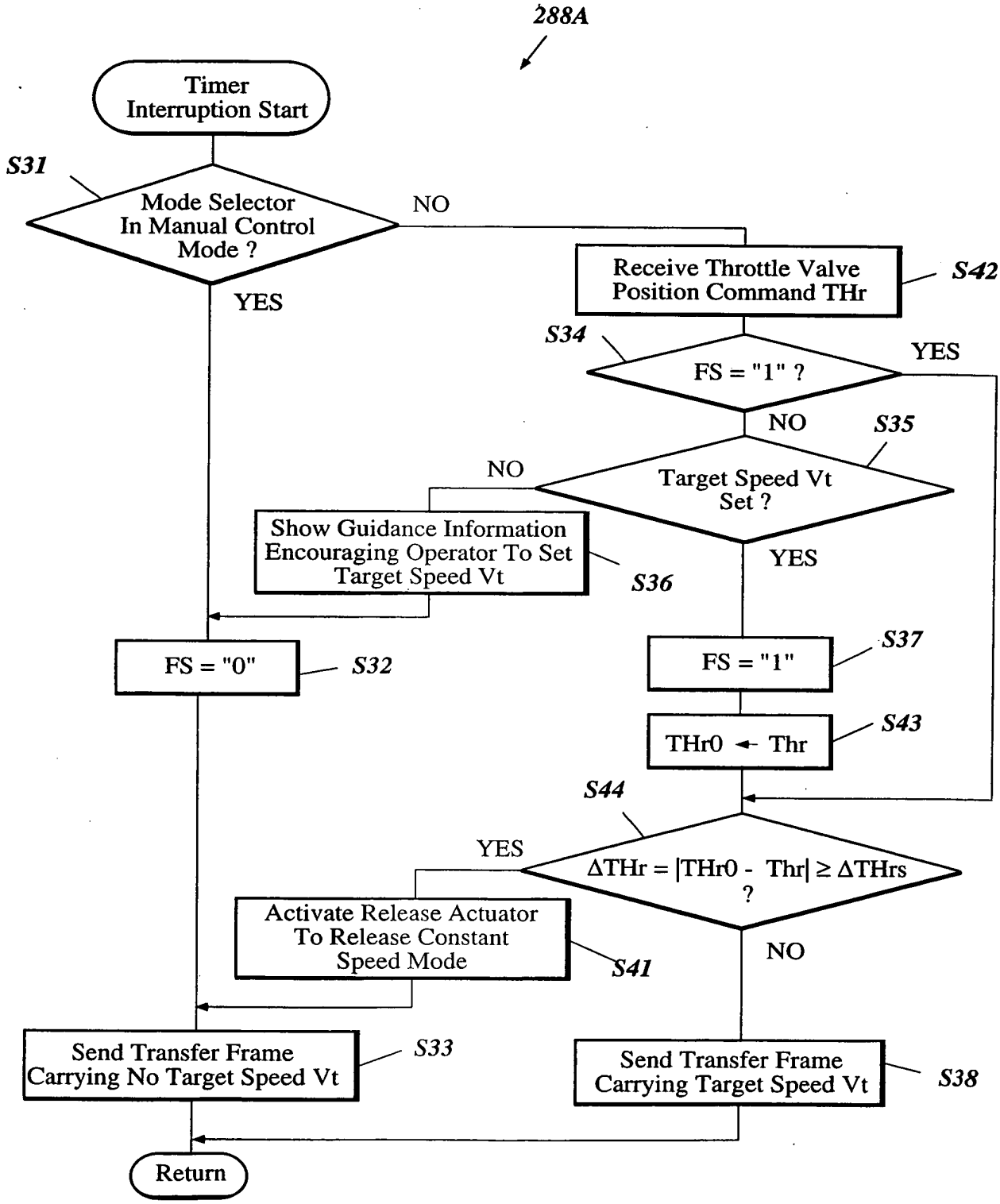
288A
Timer Interruption Start
S31
Mode Selector In Manual Control Mode ?
NO
YES
Receive Throttle Valve Position Command THr
S42
S34
FS = "1" ?
YES
NO
S35
Target Speed Vt Set ?
NO
YES
Show Guidance Information Encouraging Operator To Set Target Speed Vt
S36
FS = "0"
S32
FS = "1"
S37
THr0 ← Thr
S43
S44
ΔTHr = |THr0 - Thr| ≥ ΔTHrs ?
YES
NO
Activate Release Actuator To Release Constant Speed Mode
S41
Send Transfer Frame Carrying No Target Speed Vt
S33
Send Transfer Frame Carrying Target Speed Vt
S38
Return

Figure 12